**Motivation & Objectives**

In collaboration with an industrial partner, the project’s main goal was to find opportunities to reduce the fuel gas consumption of an existing gas refinery, using process integration techniques.

The main constraints were the re-use of the existing equipment and the fact that the refinery was not connected to the electricity grid. Based on the minimum energy requirement, several process improvements and a better integration of the utility system have been proposed and evaluated in terms of overall fuel gas consumption.

**Methodology**

The project consisted of four major steps:

- Modelling and validation of historical data
- Analysis of the process and the utility system
- Elaboration of improved solutions
- Performance analysis

**Analysis**

In order to estimate the theoretical savings on the process side, a pinch analysis was done for the entire installation. In this way, the theoretical minimum energy requirement was found and compared to the actual energy requirement.

The utility system has been scanned for possibilities of heat recovery.

**Improvements**

After having found theoretical opportunities in the analysis part, the next step consisted in finding technically feasible solutions. It was proposed to slightly change the heat exchanger network in order to reduce the process energy requirements by up to 25%.

On the utility side, it was proposed to implement a heat recovery steam generation system in order to be able to recover the heat of the gas turbines’ exhaust gases. Together with other measures, this would lead to a decrease of fuel gas consumption of the boilers by up to 61%.

**Performance analysis**

To find the overall savings in fuel gas consumption an additional model was built to simulate the entire plant. The model served as well to estimate the electricity to fuel gas price ratio which would make electricity export economically feasible.

---

**Acknowledgements**

Prof. Boris Kal soils and staff
Dr. François Marichal
Laurence Tock